

MARQUETTE

BUSINESS REVIEW

A JOURNAL OF FUNDAMENTAL BUSINESS PRINCIPLES

JUNE, 1957

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Volume I

Number 1

Published by Bureau of Business and Economic Research
Robert A. Johnston College of Business Administration
Marquette University Milwaukee 3, Wisconsin



MARQUETTE BUSINESS REVIEW

A Journal of Fundamental Business Principles

**Published February, April, June, October and
December by the Bureau of Business and Eco-
nomic Research, Robert A. Johnston College of
Business Administration, Marquette University,
Milwaukee 3, Wisconsin.**

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It is with pleasure that we welcome you as a reader of our new publication — *THE MARQUETTE BUSINESS REVIEW*.

The *REVIEW* has been designed to keep you abreast of fresh and significant ideas from the world of business useful in dealing with the highly significant questions faced by the businessman of today.

The metropolitan area of Milwaukee is as typical of the economy of the United States as any single center of population could be, representing, with few exceptions, every broad type of economic and employment activity. It is our sincere hope that the *REVIEW* may prove of service to the business community, the civil community, and individuals throughout the nation through its presentation of a comprehensive, analytical treatment of problems encountered by business in this area and the solutions to these problems as applied under given conditions.

THOMAS F. DIVINE, S.J.
*Dean of the Robert A. Johnston
College of Business Administration*

FREEDOM IN PRIVATE ENTERPRISE

by

Walter F. Gast

Chairman of the Department of Management

Saint Louis University

Freedom has its roots, not in the statutes of organized society, not in the customs and traditions of western civilization, not in the social ingenuity of reformers and their followers, but in the very nature of man himself. Freedom was not invented by man. It was not discovered by trial and error through long experience with many modes of life; it is not a product of social experiment. Neither a dialectic derivative nor a scientific induction, the concept of freedom and the need to be free entered the world with the entry of man.

Freedom is the natural right of every man. This right can be withheld, but it cannot be conferred. It can be destroyed, but it cannot be created. It can be legislated against, but it cannot be legislated into being. The positive law of man can buttress and support the freedom of man, but only the inherent natural law can decree that man must be free.

Man must be free because his nature requires his freedom. He has a claim both to the preservation of his life and to the fruitful and satisfying use of it. In the preservation and utilization of his life, the individual must make choices. His behavior is not, in the main, automatic or instinctive. His choices can be determined in either of two ways. He may make them himself, or others may make them for him. The latter condition may be voluntary or involuntary. If it is involuntary, the individual's life is no longer really his own. The restraints or compulsions to which he is subjected may, of course, be benevolently administered, but to some extent at least, they deny him that which is strictly his own, namely, his life. He is then at the mercy of others and of circumstances. He is not free to preserve and to use his life. This, of course, is unnatural.

Man is a responsible being. Every choice he makes has its effects or consequences.

Something always happens whenever one makes a decision, that is, makes a choice. What happens may be confined largely to himself, but more often it extends also into the lives of others, perhaps significantly so. The choice may consist in a decision to seek a particular end, goal, purpose or objective, or in the selection of means to an end, or in the determination of the method by which the end is to be pursued. In any event, since effects or consequences flow from the choice of end, means or method, the person who makes the choice is responsible—not only in the sense of having caused the consequences, but also in the sense of being answerable or accountable for them.

The consequences of decisions or choices may be good or bad,

that is, good or bad for man. If they further his nature and destiny, they are good. If not, they are bad. There is no neutral zone in human behavior, no sphere of indifference. There are no greys — only whites and blacks. Choice and consequence either are good or they are bad, never in between. Though man deny God, he cannot deny himself. In one way or another, sooner or later, proximately or ultimately, vocally or silently, his choices always lie in judgment before their consequences.

Only a free man can make choices. Only a free man can be held accountable for the consequences of choice. But man, by nature, has the capacity to make choices. Unfree, this capacity is subject to undue influence, but free, man cannot escape responsibility for the effects of its use.

To be sure, home, church, school, social pressures, the printed page, the counsel of others, the outcomes of experiences, all affect the decisions we make, but we remain responsible for our choices, nevertheless, and for their consequences as well. None of us is made of helpless plastic clay which, willy-nilly, conforms with the inexorable forces of environment.

One of the purposes of living is life — life in all of its true, its natural meanings and manifestations. Whatever operates negatively to limit, to curtail, to compromise, to frustrate, to destroy life is, of course, a contradiction of living. It is unnatural. Whatever operates positively to extend, to enlarge, to protect, to promote, to preserve life is a consistency with living. This is natural — not automatic, to be sure, but befitting the nature of man. If man is to act in the furtherance of his nature, he must be free to make the choices which satisfy the demands of his nature.

But free man is always responsible for the use he makes of his freedom. The nature of his responsibility merits close examination. It is vital also in business.

Man is so constituted that the individual never possesses within himself all of the capacities, abilities, competences which he needs for the normal fulfillment of his nature. Every individual is significantly incomplete. Fortunately, there is among men a great variety of competences. What one cannot do, another can. What one is not, another is. Every man needs the help of others to enable him to meet the requirements of life; and these others need him. Child needs parent, and parent the child. Husband needs wife, and she the husband. The governor needs the governed, and they need him. Teacher needs student and the latter needs the teacher. Employer needs employee, who also needs the employer. The strong need the weak and vice versa. Brilliant and dull, leader and follower, engineer, and salesman, buyer and seller, farmer and merchant, merchant and manufacturer, all need each other.

Through a great variety of organized groups — smaller societies within larger societies, departments within enterprises, firms within a national economy — the mutual needs of men, their dependencies

upon each other, are accommodated to a degree quite impossible through socially insulated individual effort.

Among men there is no such thing as independence — there is only universal interdependence, dictated by the unchangeable nature of man. Like freedom, social organization, as a principle of human life, was not invented by man. It, too, entered the world with the entry of man.

While man did not discover or invent either the principle of society or some of its basic forms, he has, however, developed many special types of social organization. As his knowledge accumulated, as the social matrix became more complex, as man's needs changed and the opportunities for satisfying them expanded, he exhibited great resourcefulness in expressing the natural principle of association in the contrivance of a great variety of group undertakings.

One of these special types of humanly devised organization is the business firm — the business enterprise. With a few exceptions, business firms in the United States are private enterprises. They are private, and not public, chiefly in the sense that they exist because individual persons were free to exercise certain natural rights and chose to use these rights in establishing a business. Among these rights are the right of private property, the right to seek wealth according to individual preference, the right to move about freely, and the right to engage in contracts. None of these rights was either created or conferred by the community or by any of its statutes or ordinances. These rights belong to all men, as individuals, simply because they are men. They are natural rights, but the exercise of these rights involves serious responsibility.

In the formation and subsequent operation of a business enterprise, investors invest their savings; employees devote their time and efforts; customers furnish patronage; the community provides law, order, protection; and other enterprises — banks, insurance companies, suppliers, etc., — provide a variety of essential services. Thus, a business enterprise is always a social fact, brought into being by the free exercise of individual rights which have their origin in the nature of man. If the business enterprise is not itself a natural social phenomenon, it certainly is an expression of natural principles. As such, it must heed the laws of nature. By them it is bound whether or not these laws have become formally expressed in statute or habitually accepted as custom. A business may violate the laws of nature if it chooses, but only at peril to the freedom of which it was born. Impressive evidence of this is readily available to anyone who examines the history of government regulation of business in the United States. The immense volume of regulatory legislation by which social control of business has been extended far beyond the limits our forebears imagined, is alarming but not because it exists, but because it was necessary. Business is not nearly as free as it was. If socialism creeps upon us or if communism should overtake us, this will not happen because we succumb to outside pressures or become the victims of social boring from within, but because we ourselves by choice, though

without forethought of consequence, fail to conform to the natural law of man and society.

Yet, this need not happen. We can, if we will, remain free. We can preserve freedom in private enterprise — but only by using our freedom responsibly.

In every organized social group — and in every business enterprise — there are inevitably two distinct sets of rights and, correspondingly, two distinct sets of responsibilities. On the one hand, there are the rights of the members of the group as individuals. On the other hand, there are the rights of the group as a group. Since the exercise of a right always produces a consequence — an effect upon the user of the right, and, what is even more important, often an effect also upon other persons — a right always carries with it a responsibility. It follows, therefore, that the members of an organized group always, with their rights, have a responsibility toward the group, and the group, with its rights, always has a responsibility toward its members.

In every social group — in every business enterprise — there exists, by the undeniable nature of things, this duality of two reciprocal relatives. The two relatives are rights and obligations. These are relatives — not absolutes. Since man, by his nature, must live and work among men, the individual can never assert or use his rights without impinging upon other persons who also have rights. Quite obviously, one could not defend the assertion of a right if by this assertion another is prevented from asserting his right. Responsibility also is relative. In a social organization, the responsibility of an individual — accountability for the use of his rights — is never merely himself. It is always in some measure also to others who, in turn, have responsibilities toward him. It requires no subtlety of reasoning to point out that if the one declines to admit or to discharge his responsibility to the other, the latter is relieved of his responsibility to the first. This is true because the willful refusal of the first has in effect, if not in fact, dissolved the social group. An organized social group is, basically, simply a set of acknowledged relative rights and responsibilities. When these are not respected, only forbearance or charity can prevent a dissolution in fact. Clearly, these rights and responsibilities are reciprocal. They never stand alone. They always attach to all parties in the group. Moreover, there is, as we have observed before, a duality in these relative rights and responsibilities. In every organized group, and in every business firm, there are after all two social entities — the individual members or parties in the group and the group as a group. Each has rights and responsibilities — the members toward the group and the group toward the members. Thus, there are two sets of rights and responsibilities; both are relative to each other; and both are reciprocal.

When these relationships exist, and are observed, and are respected in an organized group, a condition obtains which for many centuries has been known by a very simple and commonly used word. The word is justice. Justice is the fundamental principle of social organization. Justice is the fundamental principle of business enterprise. It is the one principle by which alone the preservation of freedom in

private, capitalistic business enterprise can be assured. Justice is not a Utopian concept; it is a practically attainable ideal. Indeed, men in business are truly practical only when they are just. A little honest reflection should convince anyone that injustice is the height of impracticality. The evidence of experience leaves no doubt about this, for the evidence is overwhelming.

Justice simply means the rendering to each that which is his due. The justice with which we are presently concerned, is not merely or even chiefly legal justice, and the dueness to which we refer is not by any means merely dueness under contract. To be sure, the scope of justice includes legal requirements and sanctions, and embraces contractual relationships. Yet, it extends far beyond the limits of either of these. The justice which ought to be the active fundamental principle of private business enterprise is a social justice — a rendering to each within an organized social group that which is demanded by the nature of man and of society. It is well to remember that a business enterprise is itself a society. It is merely a particular expression of a principle which is as old as man and which is necessitated by the nature of man.

The legal characteristics which, for example, differentiate a corporation from other kinds of organizations are its accidental features. They are not its fundamental characteristics. Fundamentally, a corporation, or for that matter any business enterprise, is a society, just as a family, or a congregation, or a clan, or a civic community, is a society. As such, it is bound by the same basic laws which bind every other society. These laws are the laws of nature; they are the laws of the nature of man and of society. In precisely the same sense that steel of a certain analysis and treatment may be fashioned into a variety of shapes and may be adapted to many different uses, but always remains steel requiring the scrupulous observance of the laws of its nature, so a society, whether in the form of a business corporation or not, whether large or small, is always a society requiring of its members and of it the persistent disposition to respect the natural laws of its being. If, in the manipulation of a piece of steel, the laws of its nature are not respected, the steel cannot be expected to respond acceptably to one's manipulative technique and purpose. Similarly in a society — a business enterprise — the universal laws of the nature of society must be respected if the society is to behave in a manner which will achieve its purpose. What these universal, natural laws of a society are has already been indicated, though only in the broadest possible outlines.

Every human society — family, church, business enterprise, state, etc. — exists, of course, for some more or less definite purpose. Every society embraces, as we have observed, two social entities: the members, individually, and the group, collectively. A baseball team, for example, is not simply nine players; it is also a team. In every society, each member has certain interests of his own which he expects to serve through his membership — interests which he could not, at least with the same degree of effectiveness and efficiency, serve by his own independent and unaided efforts. And in every society, the society as such, as a group, has certain interests which it must serve if it is to

survive — that is to say, if it is to make it possible for its members to satisfy their interests.

By the rather obvious nature of things, the purposes of a society — its goals, its aims, its objectives — ought to be so conceived and so formulated that the pursuit of these social or corporate objectives will on the one hand permit, and if possible assure, the satisfaction of the purposes or objectives of its members, and will on the other hand permit the survival of the society or corporate body.

In other words, if justice is to be done in a business enterprise, if the survival of freedom in business enterprise is to be assured, the objectives of the firm (the specific goals toward which it consciously operates) must be formulated in terms which will permit, encourage and reward the reciprocal respect and observance of the relative rights and obligations of the interested parties and of the firm.

In every business enterprise five distinct but closely related interests inevitably are present. These are the interests of investors, of employees (including management employees), of customers, of related enterprises, and of the community or the public. All of these interests are indispensable; all are real; all are natural; and all are equally important. An enterprise could not exist without all of them. The first two — the interests of investors and of employees — may be classified as internal interests. The last three may be viewed as external interests. The latter express the social inter-relationship of the private firm with the economy or the society as a whole. The former are the social ingredients of the firm itself.

A business enterprise — as a firm — is, by the nature of things, a member of a much larger society. It could not possibly exist otherwise. As such, it has both rights and responsibilities toward the larger society of which it is a part, and the larger society has both rights and responsibilities toward the firm. The exclusive assertion of rights, without a full acknowledgment of responsibilities by either toward the other results in a thoroughly unnatural and a manifestly unworkable relationship. In either form it represents an abuse of freedom and operates to destroy the freedom which it abuses. The doctrine of *laissez faire*, unless it means a socially responsible freedom from restraint, leads to anarchy, just as the doctrine of the absolute state leads to despotism. Both are unnatural; both are self-defeating.

Within the firm, investors and employees are, by the nature of things, members of the specific, limited society which is the firm. Both investors and employees have both rights and responsibilities toward the firm (the company, in other words), and the firm or company has both rights and responsibilities to both investors and employees. When employees are hired to serve the interests of investors; when investors are sought and placated to serve the interests of employees; when loyalty to the firm is expected of either group without a reciprocal loyalty by the firm to both; when either employees or investors seek for themselves all they can acquire; when the firm is deified and the interests of investors or of employees or of both are subordinated to the glorification of the firm; when any of these mani-

festations of a distorted and unnatural social intelligence exhibits itself, truth is violated, justice is mocked, and freedom of enterprise is effectually throttled.

Parallel observations could readily be made about the relationships between a firm and its customers, its related enterprises and the comprehensive society of which the firm is a part.

All of this is neither idealism nor sentimentalism. None of it represents the postulation of the impractical. It is simply an acknowledgement of the true nature of man in society, of the true nature of the business firm, of the true basis of freedom in private enterprise. It is not a matter of opinion; it is only the candid reflection of unbiased observation of reality. It is neither individualistic nor socialistic; it is neither liberal nor conservative; it is only realistic. It admits no other assumption than the assumption that justice — the rendering to each his due — is a principle to which all men can subscribe, from which all can derive a common philosophy of business practice, and to which no man can successfully take exception. Everyone in business or connected with it has a philosophy of some kind and operates in terms of his philosophy. Obviously, not all persons adhere to the same philosophy. Not all base their philosophy on the concept of justice. One finds injustice done by owners, by managers, by employees, by labor unions and labor leaders, by competitors, by buyers and by sellers, by government. Injustice is by no means universal, but neither is justice. Yet, the principle of justice furnishes the only tolerable guide to all who are involved in and with business, to all who value and seriously desire the survival of its freedom and their own, to all who understand that the only kind of freedom that can be expected to survive is socially responsible freedom — the kind that admits and respects the duality of reciprocally relative rights and responsibilities.

Unquestionably, the burdens of justice in business enterprise rest most heavily and directly upon the managements of business firms, upon the managements of labor unions, and upon the participants in the legislative and executive functions of government. Especially in recent decades, business managements have exhibited a most encouraging growth in their readiness to accept their social responsibilities and to implement these through practical justice both within their firms and in connection with the external relationships of their firms. To these commendable developments there have, of course, been many regrettable exceptions. Over a similar period, the managements of labor unions have not, in the main, manifested nearly the same degree of maturation in social responsibility. Discredited excesses of business managements of former days are occasionally matched today by more than equal excesses in the leaderships of organized labor. To these there are, of course, many exceptions — notable, encouraging, and commendable.

The pursuit of justice and, therefore, the preservation of freedom in business enterprise require above all else an honest dedication to just business objectives. Justice in business is almost certain to be shabbily treated unless the aims, the goals, the purposes, the objectives of a business enterprise are so conceived that the satisfaction

of the legitimate interests of investors, employees, customers, related firms, and society at large can reasonably be served and satisfied through their joint involvement in the private business firm.

A dogmatic postulation of certain business objectives cannot be expected to be convincing to those whose habits, predilections or convictions have led them to a preference for other objectives. Nevertheless, the normal limitations of reader patience and the necessary restrictions of space scarcely permit much more than a bare enumeration of the particular business objectives whose soundness, adequacy and attainability could, in a more lengthy discourse, be defended as the requisites for justice and freedom in private business enterprise. These objectives seem to be the following:

1. The production of a commodity or service which satisfies a need.
2. The provision of opportunities for the productive employment of employable persons.
3. The satisfaction of the normal, non-economic occupational aspirations of both operating and management employees.
4. The increase of wealth within society, through the economical utilization of capital, labor and land.
5. A just wage to labor.
6. A just return to the owners of capital.

These objectives are proposed as ends or goals in themselves — not as means to other ends. It may astonish the reader that in this enumeration there is no mention of profit. Properly viewed, profit is gain over and above a just return on capital. So defined, "profit" clearly has no place in a set of business objectives calculated to achieve the requirement of justice. One can scarcely avoid the observation that too much of damaging nonsense has been uttered about the place and significance of "profit" in business enterprise.

Again, the reader may object that "just wage" and "just return on capital" are concepts so nebulous and so exposed to the vagaries of pure opinion as to lack all value in the concrete, practical situations of business. Admittedly, only careful judgment, unaided by any valid formula, can provide even approximate answers to the problems of justice in wages and earnings. Nevertheless, there is more than ample ground for the conviction that among men the will to be just sufficiently assures a workable agreement on the answers to the practical problems of justice in business.

Perhaps the first and the best steps toward the maintenance and preservation of freedom in private, capitalistic business enterprise would consist in efforts to generate, to spread, and to deepen in the managements of business, labor and government the disposition to be as just as possible. For this, at least a basic philosophic insight into the nature of man in society would seem seriously to be recommended.

"WE COUNTED THE SMOKESTACKS!"

A Study of Product Diversification in Action

By

A. F. Smith

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"Counting Smokestacks" is an expression frequently used to portray measuring industrial markets. When one of our ceramic technicians came up with a new idea, however, we followed in the footsteps of some pioneer industrial marketing research people. But, instead of doing a census of stacks to get an industrial activity index or territory quota as they did, we were trying to estimate the smokestack market itself — where it was — how big it was — peculiarities of the market, and all such useful descriptive factors. The reason was that our technician had suggested a glass-coated steel smokestack that would be corrosion-proof!

Modern industrial corporations usually sell products, processes, or a combination of the two. To achieve some degree of understanding of our company's approach to planning a product for manufacture and sale, a few fundamentals must be reviewed. First of all, we keep the general corporate objectives in mind and relate them to what is being proposed as a new product. Depending on the structure of a corporation and the diversity of its lines, internal problems might result from adding the wrong product. On the other hand, it might be possible to strengthen the whole structure by adding a particular line.

As a general statement of the case, additions to product lines may result from expansion in the same markets one is now in, or through applications in other markets not now covered. Or, completely new products may be manufactured for the same markets a company is now in or for completely new markets.

Next, we had to consider specific reasons for the proposed product diversification or addition. The A. O. Smith Corporation has ten commercial divisions, each producing a separate line of products and reaching different markets. We manufacture and sell steel products ranging from 15¢ per unit to \$150,000 or \$200,000 per unit. We sell to markets which may encompass all U. S. manufacturing activity in some instances and which may cover only one thin segment in others.

Our reasons for diversifying or planning a new product, therefore, may include one or more of the following list, which is certainly not complete. The reasons must be considered with respect to their relative weight in the given product situation and with reference to the general corporate framework, which would be true for any company.

1. Disappearance of a market.
2. Demands imposed on us by the geographic movement or shifting of a market.
3. To improve profits and margins.
4. Stabilization in terms of seasonal and cyclical fluctuations.
5. Development of a unique product which gives greater utility for the same or less cost to the consumer.
6. To utilize our present market position and know-how.
7. To meet changing requirements of a market.
8. To help sell other products now in line.

These factors must also be reviewed carefully with respect to other considerations. They may help to eliminate the pressure of personal whim on the part of individuals or groups or unwillingness to recognize mistakes made in research and development of products which aren't useful or wanted; or, failure to keep a careful watch of movements and developments in markets we serve. This doesn't cite all of the dangers, but it illustrates the need for carefully analyzing and weighing reasons given for diversifying or planning new products.

These basic considerations were resolved into a few simple questions before we went ahead with the smokestack project:

1. Were we sticking to our last, like the shoemaker is supposed to do, or were we getting into areas we knew nothing about? Does this fit our general corporate product objectives?
2. Was our product unique, with really saleable features, or was it just another product?
3. Could we make and sell these unique features so that the customer got relatively more for his money in terms of satisfaction of needs?
4. Could we make a profit on the proposed new product, and how long could we take a "going-in" loss?
5. How much money could we tie up in this venture in terms of facilities?
6. Could we fit this product into our sales program and organization, or did we need a completely new and different sales group?

The ceramic technician who suggested the smokestack was not thinking of a plain steel structure. He proposed that we manufacture a glass-coated steel stack. In this fashion, we could capitalize on a number of our technical and production skills. It happens that A. O. Smith has about 30 years of experience in the successful production of industrial and consumer glass-lined and glass-coated steel products. We make large brewing tanks, agricultural and industrial storage units, domestic water heaters, year around air conditioning units, hot water storage tanks, special pipe and fittings, and chemical industry equipment — all glass-lined or glass-coated.

Although we show more tonnage and dollar volume in the manu-

facture of plain steel products for the automotive and petroleum industry, this glass-steel aspect of our business is extremely important. It is not a common type of "know-how" and we are able to sell a quite specialized engineering and technical skill. The glass-coated smokestack proposal was therefore not one where we were necessarily wandering afield — A. O. Smith knew quite a lot about the art of making glass stick to large steel structures. However, we did need answers to all of the questions raised earlier.

Were we sticking to our last? We thought so. This was a welded steel structure — to be glass-coated inside and out. Our forte is supposed to be utilization of heavy steel plate, and we knew a lot about glass-steel applications.

Was our product unique? Well, there isn't really much new under the sun and the idea had been tried before. However, no one had been able to get around certain technical manufacturing problems involved in making this apparently simple application. Our engineers and research technicians solved the problem. We did have an interesting, unique product, it appeared. A few inquiries to potential types of users were made as an initial pilot approach. Engineering consultants and similar people liked the idea; one firm wanted to hold up a new power plant if we could promise stacks within 6 months.

Could we manufacture and sell the stack for a higher price, and still give advantages to the customer which would justify our demands for more money? In our research organization we have a manufacturing economics and analysis group. They made estimates and projections which showed that the stack would cost more money than a conventional plain steel one. However, it had a proportionately much longer life, so the customer was really paying less per year of use. Our stack appeared to have other advantages too. It did not require painting; it tended to be self-cleaning when rain fell on it; it looked good — had a fine glossy, deep blue color. Permanent identification symbols such as names or emblems could be fused into the glass. Users would also spend less money for down-time when new stacks were being erected. Since some stacks have a relatively short life, this could be quite a consideration.

What about profits and the capital expenditure required? Our economic analysis showed that acceptable profit rates were possible with a very reasonable investment in additional special facilities. The method proposed for manufacture and glass coating was not conventional, but it had worked well on pilot models.

Finally, did it fit into present A. O. Smith sales activity? The stack appeared to fit into our Process Equipment Division as a product, but this was really something we had to try out under field conditions. There was no ready formula for this situation — it involved some trial and error.

While all of this preliminary study was in process, other events had taken place. We were going to be our own first customer! Several test stack sections had previously been erected at our main plant in Milwaukee. Now, however, we needed a new stack; this was a perfect

opportunity to glass coat a stack, and also to attempt the more difficult job of putting up the first one. It was going to be 80 feet high, in four 20 foot sections, and working space was limited.

Would the erecting crew make a mistake and ruin the glass-coat? How carefully did this have to be handled? Would it fit properly? (We didn't want to have to drill holes now). The new stack went up without a hitch, and our product proved very resistant to ordinary banging and bumps. The engineers in the boiler house were very pleased with the new addition — it did what it was supposed to do, and looked very handsome in the morning sunshine.

The marketing research department had in the meantime put together basic statistics on the number of plants in geographic areas of the United States. We studied types of manufacturing activity and calculated annual replacement of stacks; we had come up with favorable estimates in terms of the cost analysis made by the research economics group.

Everything seemed to point to a successful product — but we didn't know whether power plant engineers would buy an unknown product. They have an unhappy custom of wanting to know who has bought a stack — what company, and at what address. They like to get first hand data most of the time. The publicity we received during the erection of the stack at our plant proved to be a real help. Inquiries came in from all parts of the country; we were not only able to classify them by types of markets represented, but also to sample them for the purpose of making interviews.

Several conferences with our own power plant engineers made possible the successful development of a short marketing questionnaire which also satisfied our research and engineering technicians. We had to determine ranges in operating temperature, types of fuel used, chemicals and contaminants which might be present in the smoke, life of stacks used, sizes, heights, and many similar factors. We wanted to try to establish what might be some sort of average annual maintenance cost and original stack cost. We also hoped to get opinions on what customers would pay for longer life, less maintenance and similar factors. We hoped to be able to establish a pricing curve which would reconcile cost, profits and the market's estimate of the value we were offering.

Field interviews followed and included reactions from engineering firms, power plant architects, and representatives of users. We found much interest; we obtained the types of information we needed; we were able to set up some average cost and price figures. All of this worked out in such fashion that there wasn't much left to do except for A. O. Smith to go into the glass-coated smokestack business.

Now what has been the result? First of all, we have a product and we're in business! The stacks put up in our own plant have been in place for three years and the areas which have usually caused trouble in plain steel stacks are just like new. We've sold a number of stacks, and customers are satisfied to the point of being willing to pay our higher prices in return for the advantages gained. We have

been able to develop size ranges the market wants and types of glass for various operating characteristics. A recent corporate advertisement featuring the stack pulled in 300 inquiries from a national cross section of U. S. industry which means we have a product with a horizontal market, it seems.

We are evolving the best way to sell our smokestack. It is a specialty item; it requires a certain kind of handling (although we've since found that no special factory-trained erection crews are required); finally, this more expensive stack needs to be sold. We have unique features, extraordinary life, and a lot of plus values. We find prospects willing to listen and buy but they have to be sold and sold on why they can afford to spend more money now for future gain.

This brings up to date the planning and launching of one of our new products — the glass-coated smokestack. It represents the kind of coordinated thinking and effort required from research, manufacturing and marketing groups if product planning is to be reasonably successful. However, this isn't the end of the story. In our fast-changing world, continual study and review is required. To paraphrase a famous statment, "We have just begun to count!" . . . the stacks, that is!

The A. O. Smith Corporation, with headquarters in Milwaukee, is known for its heavy steel fabrication; automobile and truck frames; petroleum and natural gas line pipe and oil well casing; refinery and chemical processing equipment; domestic water heaters and heating equipment; electric motors and many other products. It has 10 commercial product divisions, 10 domestic plants, and employs about 14,000 people. It has a sales force of about 300 men.

A. O. Smith is decentralized to a large degree, and is considered to be quite diversified. Once principally a large original equipment manufacturer, the corporation now also produces goods for both industrial and consumer markets under its own brand names.

A STUDY OF ELECTRONIC COMPUTER INSTALLATIONS AS REPORTED BY 61 COMPANIES IN 1957*

by

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From the time of Taylor and Gilbreth to the present day, remarkable strides have been taken in industrial techniques increasing the productivity of labor. Improvements in labor-saving machinery have today progressed to such an extent that completely automatic factories are now envisioned for the not too distant future. While industrial techniques were improving rapidly, office techniques were falling far behind. Mechanization of office procedures was negligible and as work loads mounted, additional workers were hired. The number of clerks per 100 manufacturing employees is reported to have increased from 11 to 16 in the past 15 years.

The development of the electronic computer and its introduction to the processing of business data heralds the beginning of method improvements in the office. Management today sees in these electronic brains the opportunity for increasing the productivity of its office force and for accelerating the processing of business data.

Electronic computers are relatively new in the field of business. The announcement by one of the leading manufacturers of this equipment that it had recently completed the installation of its 100th large size and 500th medium size machine is indicative of the important growth of the number of computers in use. It is interesting to note that all of the large size and medium size computers were installed during the years 1955 and 1956, thus showing how recent is the adoption of electronic computers to the processing of business information.

This article is an attempt to summarize approximately 200 questionnaires mailed to users of electronic computing machines. Questionnaires were confined to companies known to have electronic devices manufactured by Burroughs Corporation (Electro-Data Division), International Business Machine Corporation, and Sperry Rand Corporation.

Electronic equipment is normally classified as large and medium. Among the large computers are included the 700 series produced by International Business Machines, and the Univac I manufactured by Remington Rand Division of the Sperry Rand Corporation. Medium

*This study was done through the facilities of the Bureau of Business and Economic Research, Marquette University. Requests for copies of the complete study should be sent to the Director. Price, \$4.00.

size computers include the Datatron built by the Electro-Data Division of the Burroughs Corporation, the International Business Machine Corporation 650, and the Univac File Computer. The distinguishing characteristics of the large computers are their greater storage memory and higher calculation speed. A magnetic tape is used both for the storage of data and for processing. Computer operations are controlled by means of a stored program.

The International Business Machines 702, 704 and 705 may be described as large computers. The International Business Machines 702 have been largely superseded by the International Business Machines 705, which has increased storage capacity and increased speed. The International Business Machines 704, primarily intended for engineering calculations, is used occasionally for business data processing on a part-time basis. The International Business Machines 705 is a large scale, alphanumeric, general purpose computer providing magnetic tape input-output at a rate of 15,000 characters per second. Internal memory is of the magnetic core variety (20,000 characters) and magnetic drums (60,000 characters per drum). A complete line of peripheral equipment, including printers, card readers and punches is available. These may be connected directly to the computer or activated in connection with magnetic tape units. Monthly rental is in the range of \$25,000 to \$35,000.¹ The first International Business Machines 705 to be purchased outright was bought by the Prudential Life Insurance Company for \$947,000.²

Univac I—The Univac I is a large-scale, alphanumeric general purpose computer providing magnetic tape input-output at a rate of 10,000 characters per second. Internal memory is of the mercury column variety, 1,000 12-digit word (12,000 characters) capacity is standard. Extensive duplicate internal circuitry is provided for self-checking purposes. A complete line of peripheral equipment including printers, punched card to tape converters and punched tape to magnetic tape converters is available. Purchase price for a system ranges between one million and one-and-a-half million dollars. Monthly rentals will range from \$25,000 to \$35,000.³

Medium Size Computers—Basically, medium size computers use a magnetic drum as their internal memory unit. Speed is somewhat slower than that of the large scale computers.

Datatron—"The Datatron is a medium scale magnetic drum general purpose decimal computer utilizing perforated tape, punched cards and magnetic tape as input-output. Alphanumeric information can be processed by utilizing two decimal positions. The capacity of the drum is 4,080 words to 10 digits each (40,800 characters). Direct output is achieved by connecting an International Business Machine printer to the computer. 'Data File' units can be connected to the computer. These units provide a random reference magnetic tape

1. Frank Wallace, *Appraising the Economics of Electronic Computers*: (New York, Controllershship Foundation, 1956), p. 92.
2. "Business Week Magazine," February 23, 1957, p. 173.
3. Herbert F. Klingman, Editor, *Business Electronics Reference Guide*, Vol. 3: (New York: Controllershship Foundation, 1956), p. 94.

file of 20 million character capacity each, with an access time of from one-half to 24 seconds, depending on the arrangement and size of the file. Purchase price for an average system is about \$250,000. Monthly rental of such a system is approximately \$7,500."⁴

International Business Machines 650 — "The International Business Machines 650 is a medium-scale magnetic drum stored program computer utilizing punched cards as input-output. Drum capacity may be either 1,000 or 2,000 words of 10 digits each plus sign (10,000 or 20,000 characters). The basic machine is decimal only, although an alphabetic device may be had at additional cost. Magnetic tape units and an output printer may be connected to the computer. Random access memory of 2 to 24 million digit capacity may also be connected to the International Business Machines 650 system. Rental for a typical system ranges from \$4,000 to \$11,000 monthly."⁵

Univac File Computer — "The Univac File Computer is a medium scale drum computer offered in two models. The Model 0 is plug-board programmed. Model 1 utilizes internally stored programs. A wide variety of optional input-output devices are provided including punched card units, magnetic tape units, and keyboard and punched paper tape units. Random access storage is provided through utilization of one or more large magnetic drums, each of which has a capacity of 180,000 alphanumeric characters. The purchase price of a basic Model 1 system with one large drum and punched card input-output is about \$270,000, while the monthly rental runs about \$6,000."⁶

The use of electronic computers for the processing of business data is not restricted to a few industries. The study indicates the following: life and casualty insurance companies make the most extensive use of computers and account for 18.1% of the equipment surveyed by this study. Public utilities and chemical companies are the next largest users, each accounting for 7.3% of the machines. Today, computer installations are found in almost any type of industry, ranging in extreme from abrasive manufacturers to permanent wave manufacturers.

Following is a summary of replies submitted by 61 cooperating companies that are presently using electronic computer installations for processing business data.

4. *Ibid.*, p. 93.

5. Klingman, *Op. Cit.*, p. 94.

6. *Ibid.*, p. 94.

SURVEY OF COMPANY APPROACHES TO ELECTRONIC DATA PROCESSING SUMMARY OF REPLIES

					LARGE-SIZE COMPUTERS	MEDIUM-SIZE COMPUTERS	TOTAL LARGE AND MEDIUM-SIZE COMPUTERS
TYPES AND NUMBER OF COMPUTERS INCLUDED IN SURVEY:							
IBM	702	8	DATATRON	3			
IBM	704	2	IBM 650	25			
IBM	705	13	UNIVAC FILE COMPUTER	5			
UNIVAC	1	5					
TOTAL		28	TOTAL	33			
					TOTAL 28	TOTAL 33	TOTAL 61
ACCOUNTING METHODS:							
Cost system used; Job order					10.7%	9.1%	9.8%
Process					14.3	12.1	13.1
Standard					14.3	21.2	18.0
Combination of above three					10.7	12.1	11.5
Other					50.0	45.4	47.6
Home Office Accounting:							
Centralized					57.2	57.6	57.4
Decentralized (at factory level)					7.1	18.2	13.1
Complete autonomy of units or subsidiaries					28.6	15.1	21.3
Combination Centralized and Decentralized					7.1	—	3.3
Not Indicated					—	9.1	4.9
OBJECTIVES IN UNDERTAKING FEASIBILITY STUDY:							
Cost reduction in data processing					32.1	15.1	23.0
Speeding preparation of reports					—	9.1	4.9
Both cost reduction and speeding reports					67.9	66.7	67.2
No comment					—	9.1	4.9
Other additional objectives					28.6	48.5	39.3
METHODS USED IN FEASIBILITY STUDY:							
Use of management consultants — Yes					17.9	15.1	16.4
No					82.1	84.9	83.6
Consultants responsible for study — Yes					—	—	—
No					100.0	100.0	100.0
Public accounting firm assisted — Yes					10.7	3.0	6.6
No					71.4	90.9	82.0
No Comment					17.9	6.1	11.4
Study conducted by company personnel — Yes					100.0	100.0	100.0
No					—	—	—
Survey group reported to — Controller					39.2	57.6	49.2
President					3.6	12.2	8.2
Vice-President					14.3	3.0	8.2
Treasurer					3.6	9.0	6.6
Other					14.3	12.2	13.1
Not Indicated					25.0	6.0	14.7
METHODS USED IN ORIENTATING SURVEY PERSONNEL:							
Attendance at university courses — Yes					17.9%	9.1%	13.1%
No					82.1	90.9	86.9
Attendance at university institutes — Yes					28.6	27.3	27.9
No					71.4	72.7	72.1
Attendance at courses given by computer manufacturers —							
Yes					96.4	97.0	96.7
No					3.6	3.0	3.3
Manufacturers' courses attended — IBM					92.9	90.9	91.8
Remington Rand					46.4	54.5	50.8
Other					17.9	12.1	13.1
Courses which proved most helpful —							
University courses					—	—	—
University institutes					—	—	—

	LARGE-SIZE COMPUTERS	MEDIUM-SIZE COMPUTERS	TOTAL LARGE AND MEDIUM-SIZE COMPUTERS
Conferences and conventions of technical Societies —			
Helpful	35.7	51.5	44.3
Not helpful	50.0	45.4	47.5
No comment	14.3	3.0	8.2
SELECTION OF PRELIMINARY SURVEY PERSONNEL:			
Prior work experience most frequently mentioned			
LARGE-SIZE COMPUTERS			
Methods works			
Systems works			
Punched-card methods			
Accounting			
MEDIUM-SIZE COMPUTERS			
Computer manufacturers' courses	78.6	87.9	83.6
No comment	21.4	12.1	16.4
Punched-card methods			
Accounting			
FACTORS IN SELECTION OF SPECIFIC COMPUTER:			
Internal memory capacity of prime importance	71.4	63.7	67.2
Internal memory capacity of secondary importance	21.4	30.3	26.2
Internal memory capacity of little or no importance	3.6	3.0	3.3
No comment	3.6	3.0	3.3
Speed of computation of prime importance	53.6	39.4	45.9
Speed of computation of secondary importance	39.3	51.5	45.9
Speed of computation of little or no importance	7.1	6.1	6.6
No comment	—	3.0	1.6
Other factors of prime importance	—	21.3	21.3
RENT OR PURCHASE:			
Companies renting computers	89.3%	93.9%	91.8%
Companies purchasing computers	7.1	6.1	6.6
Not indicated	3.6	—	1.6
Number of years in which companies which purchased computers estimated that cost of the equipment would pay for itself through savings in their data-processing costs			
	4 to 5 years	4 to 5 years	
Rental of computer resulted in rental savings on equipment it replaced	—	9.1	4.9
No rental savings resulted	67.9	78.8	73.8
No comment	32.1	12.1	21.3
PREVIOUS ASSOCIATION WITH COMPUTER MANUFACTURER:			
Same manufacturer as former tabulating equipment —			
Yes	89.3	84.8	86.9
No	10.7	15.2	13.1
Necessary to convert data accumulated under prior accounting method — Yes	82.1	30.3	54.1
No	17.9	69.7	45.9
New input method used with computer			
Magnetic tape	100.0	27.3	60.6
Cards of another manufacturer	3.6	3.0	1.6
Perforated paper tape (additional)	—	3.0	1.6
SELECTION OF PROGRAMMERS:			
Hired from outside the company	—	3.0	1.6
Selected from within company	64.3	78.8	72.1
Some hired from outside but majority from Co.	28.6	15.2	21.3
No comment	7.1	3.0	5.0
Education background of programmers:			
	Some college graduates, but majority were high school graduates	Same as for large-size computers	

		LARGE-SIZE COMPUTERS	MEDIUM-SIZE COMPUTERS	TOTAL LARGE AND MEDIUM-SIZE COMPUTERS
Prior work experience of programmers:				
	Systems analysts, Punched-card equipment operators or supervisors		Same as for large-size computers	
Aptitude tests used in selection of programmers —				
	Yes	57.1	12.1	32.7
	No	28.6	87.9	60.7
	No comment	14.3	—	6.6
Where used such tests were helpful		93.3%	100.0%	94.7%
Where used such tests were not helpful		6.7	—	5.3
PROGRAMMING:				
Number of man-months needed to program each of the following applications:				
Payroll	5MM to 360MM		1MM to 64MM	
Inventory control	14MM to 150MM		2MM to 60MM	
Production control	10MM to 20MM		2MM to 6MM	
Invoicing	6MM to 600MM		—	
Cost accounting	6MM to 96MM		6MM (1 only)	
SELECTION OF COMPUTER OPERATING PERSONNEL:				
Educational background of operating personnel:	Mostly high school graduates only		Same as for large- size computers	
Prior work experience of operating personnel:	Punched-card equipment operators		Same as for large- size computers	
Advanced college degrees considered desirable of computer operating personnel — Yes		21.4	18.2	19.7
	No	57.2	75.7	67.2
	No comment	21.4	6.1	13.1
Prior tabulating experience sufficient to qualify persons for computer operations — Yes		32.1	72.7	54.1
	No	42.9	15.2	27.9
	No comment	25.0	12.1	18.0
Aptitude tests used in selection of computer operating personnel — Yes		35.7	18.2	26.3
	No	46.4	78.8	63.9
	Not indicated	17.9	3.0	9.8
Where used such tests were helpful		80.0	66.6	85.6
Where used such tests were not helpful		20.0	—	14.4
SCOPE OF APPLICATION:				
Computer operation limited to a single application —				
	Yes	14.3	9.1	11.5
	No	75.0	90.9	83.6
	No comment	10.7	—	4.9
Typical single application	Public utility customer billing Payroll		Payroll	
Abbreviation — MM — Man Months				
Typical multiple applications				
(Chemical Co.)				
Payroll		35%		
Inventory Control		20%		
Sales		15%		
Engineering		30%		
		100%		

	LARGE-SIZE COMPUTERS	MEDIUM-SIZE COMPUTERS	TOTAL LARGE AND MEDIUM-SIZE COMPUTERS
(Oil Refiner)			
Production Accounting		60%	
Marketing Accounting 15%		15%	
Pipeline Accounting		20%	
Engineering		5%	
		<hr/>	
		100%	
(Railroad)			
Payroll	25%		
Revenue Accounting	50%		
Miscellaneous	25%		
	<hr/>		
	100%		
(Electronics Manufacturer)			
Payroll		40%	
Inventory Control		20%	
Engineering and Research		5%	
Testing and Debugging		35%	
		<hr/>	
		100%	
USERS RECOMMENDATIONS:			
Systems study found to be most important aspect of preliminary survey	21.4%	30.3%	26.2%
Cost comparisons were most important aspect of preliminary survey	42.9	33.3	37.7
Both systems study and cost comparisons were of equal importance	14.3	24.3	19.7
Other considerations	10.7	12.1	11.5
No comment	10.7	—	4.9

LINEAR PROGRAMMING FOR INDUSTRY

by

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One of the interesting sidelights of World War II was the work done by scientists, engineers, and mathematicians on the problems of tactics, transportation, scheduling and the best combination of men and machines for optimum effectiveness in a variety of situations. The men who developed these techniques, as well as others who saw them in use or who heard about them, were responsible for the great interest in applying comparable methods to business pursuits and in extending the development of the science of management to new areas. *LINEAR PROGRAMMING* is one such technique.

The problem here, as with other methods of scientific management, is the attempt to describe a particular company operation in terms of mathematical formulas. These formulas may be simple, involving merely arithmetic or algebra; or, in terms of more complex business problems, they may demand a knowledge of calculus and matrix theory. Despite the formidable sound of the name given to the method of linear programming, it should be emphasized that the actual techniques of solving the mathematical formulas are well within the abilities of the average individual who has a standard education or some experience in other scheduling processes.

Linear programming is the method of determining the optimum effectiveness in a situation in which there are a number of things to be done, with certain restrictions present, and with alternate ways of doing the job.

Optimum effectiveness can be measured in terms of maximum profit, minimum loss, maximum production, minimum running time, minimum scrap, and in other ways depending upon how one looks at the particular problem.

The problems in which linear programming is most effective are those in which the required amount of work is to be done in the most economical way, and those in which the most effective use of materials and machines is the focal point for determining output.

Linear programming techniques are usable only in problems in which a linear (straight line on a graph) relationship exists between factors under consideration. If the relationship between the factors is not a linear one, it should be closely approximate in order for the techniques to be used. On occasion when a non-linear relationship exists between data, it is possible to use linear techniques following the application of transforms such as logarithms or square roots. Some

non-linear methods, called *dynamic programming* and *mathematical programming*, have been developed, but many practical difficulties present themselves in their application. The techniques of non-linear programming are so very complicated that this article will restrict itself to the more basic approach — *linear programming* — with the assumption of a linear relationship between factors.

The normal linear programming problem will involve more factors or variables than can be taken into consideration by the equations to be used. Among the factors placing restrictions upon the problem may be the number of machines, a one-shift operation, limited raw materials, and production rate per machine. All such possible restrictions must be recognized. Should the problem be too complicated, only the major restrictions can be used, recognizing, of course, the possible effect on the results of the analysis.

A problem in linear programming presupposes the existence of alternate ways of doing the job. If there is only one way of doing the job, or of satisfying the requirements, there is no problem of optimization.

What type of problem can be solved through linear programming? What techniques are available for solving these problems? Where is additional information available concerning this subject?

There is an extensive class of problems known as *transportation problems* which can be solved by linear programming. Some people prefer to call them problems of *allocation analysis*. A simple example follows:

Transportation is to be arranged to transfer the entire output of three factories to four distributing points in different parts of the country. All of the product must be shipped. For the solution to this problem it is necessary to know the outputs of the factories, the amount required by each distributor, and the transportation rates for getting the material to the distributing points. Does this problem satisfy the definition of one in linear programming? Obviously, it does. The relationship is linear, that is, the freight rates are measured in dollars per unit of weight; and the restrictions of output and demand are present. Are there alternatives present? Yes, if you consider that the output of each factory could be sent to any of the distributing points. Practically speaking, it might make sense to ship to the nearest distributing point. However, this can be done only if the requirements are equal to output at the nearest distributing point.

Although this is a relatively simple type problem in programming and could be solved by an experienced scheduler in a very short period of time, it could be enlarged to the point where the usual scheduling schemes would not work or, if they could be used, would consume far too much time. Here linear programming should take over.

As a second illustration of the transportation-type problem, assume that fifty orders are to be assigned to four machines. The word "order" is used to mean part-number or groups of part-numbers in

which each item in the group is produced in about the same length of time. The production rates must be known or available for each machine. What is the best schedule for assigning orders to machines to minimize running time? This problem can be solved readily by the average individual trained in linear programming routines. Such a problem may, of course, involve other factors such as set-up time, incentive pay, scheduled and estimated non-scheduled "down-time," in which case the problem becomes more complex.

Another well known category is that of the *mixture problems*. The problem here is to select a combination of components subject to certain restrictions which will maximize profit or minimize cost. The dual relationship between maximizing one factor and minimizing some other factor is usually present. However, with each method, certain approaches are easier from the point of view of computation.

Some of the best examples of *mixture problems* are found in gasoline blending and refinery operations. The idea is to produce the best combination of products to maximize profit. Sometimes the problem is one of the disposal of by-products and waste. Perhaps it is one of inclusion of an item in a product line.

Illustration of *mixing problems* abound. They are found frequently in the food-stuff industries. Requirements such as units of minerals, vitamins, moisture content, protein, etc., are placed on products. Here the linear programmer aims at maximizing profits through the best use of raw materials available.

The linear programmer steps in again in many cutting operations in which a basic unit is to be divided. Here scheduling operates to great advantage in minimizing loss.

Linear programming in industry is relatively new. As the programmer enters, he frequently encounters, on the part of businessmen, a magnified fear of theoretical approaches to what has been handled in a different, "practical" fashion. Thus, the programmer must bear the educative burden, giving to those in industry a better understanding of the problems involved in production scheduling, transportation, and sales. The best test of the efficacy of linear programming is found, of course, in increased profits over the long run.

There are other advantageous ramifications of linear scheduling. Detailed and critical analysis of a problem may ultimately show that linear techniques are less useful to the solution than other methods might be, but the careful preparation and clearer understanding already achieved, will be of value whatever the method finally followed.

Since the application of linear techniques is still quite new to business problems, there is as yet relatively little literature on the subject and but few training courses available. Universities have done excellent work and met great success both in offering short, intensive courses and in including presentations of this method in their regular courses. The Linear Programming Society does not as yet publish

a journal, but information is exchanged and disseminated through round robin letters.

The following bibliography is unfortunately brief; the first two publications will be of help to anyone interested in the subject; the last three have served as sources for this article.

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WATCH WISCONSIN

A Comparative Analysis of Retail Sales Trends

By

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Total retail sales in May were estimated at \$16.9 billion — approximately 4% above the year ago level. This compares with a 10% gain in April versus a gain of only one percent in March, reflecting an extra selling day in April and the fact that Easter was in April this year; whereas last year it was in March.

Although approximately 50% of the gains recorded thus far this year are a reflection of price increases, the unit volume has been consistently above year-ago levels and the present outlook is for a new all-time high in retailing for the year 1957. This appears to be particularly significant in view of the general levelling off in the rest of the economy, as revealed by a six-month plateau in industrial activity, plus a continued decline in residential construction which has extended over a period of two years.

The most dynamic components of the retailing structure are food stores, drug stores and gasoline service stations, in part respectively reflecting increased sales of non-food items by supermarkets, increased sales of pharmaceuticals, and more cars on the road.

Department stores are looking forward to continued substantial gains of approximately 5%; however, furniture and appliances, lumber, building materials and hardware appear to be adversely affected by the decline in residential construction. Automotive sales continue above year-ago levels, but substantially below the all-time highs established in 1955.

Sales for the first quarter of 1957 compared with the same period in 1956 were as follows:

	Per Cent Change
Total Retail Sales	4.1
Gasoline Service Stations	9.0
Food Stores	5.8
Automotive	5.2
Drug and Proprietary	3.9
Eating and Drinking Places	1.5
Furniture and Appliances	0.2
Lumber, Building, Hardware	-0.3
General Merchandise	-2.1
Apparel	-3.0

States currently showing gains in total retail sales exceeding the National average are: Ala. (8.3%); Ariz. (11.6%); Calif. (8.4%); Fla. (11.7%); Nev. (10.0%); New Mexico (12.1%); and Ore. (9.7%); Cities showing gains of 12% to 20% above the National average are: San Diego, San Jose and Sacramento, Calif.; Appleton, Wis.; Galveston, Texas; Mobile, Ala.; Orlando, Fla.; Lawrence, Mass.; and Trenton, N. J.

***Monthly Index of Retail Sales
vs. Year Ago**

	1957 vs. 1956		
	May	April	March
National Average	104.0	110.0	101.0
MAJOR CITIES			
San Diego	124.6	132.8	119.5
Pittsburgh	111.4	118.1	106.6
Houston	107.5	115.3	106.3
Buffalo	106.7	115.1	105.9
New Orleans	106.3	113.7	104.1
MILWAUKEE	105.4	113.4	105.1
San Francisco	104.9	112.2	103.0
Cleveland	104.6	110.3	101.0
Minneapolis	103.3	109.1	99.4
Los Angeles	102.8	107.4	98.3
Kansas City, Mo.	102.5	107.8	97.5
Dallas	101.8	107.4	98.3
New York City	101.3	107.1	97.7
Chicago	101.2	105.8	97.3
Philadelphia	101.0	106.9	99.3
Atlanta	101.0	107.0	97.6
Detroit	100.7	106.5	95.0
St. Louis	100.0	105.8	97.5
Cincinnati	99.8	105.6	97.6
Baltimore	99.5	104.8	96.5
Boston	98.9	105.8	98.3
Washington, D. C.	97.4	102.4	94.2
Other Wisconsin and Illinois Cities			
Appleton	120.4	128.7	117.3
Superior	111.0	118.4	107.3
Sheboygan	108.4	115.2	104.9
Green Bay	107.4	114.8	104.3
Beloit-Janesville	104.9	110.4	101.8

Racine	101.5	107.3	99.2
La Crosse	101.0	109.2	101.0
Madison	100.0	104.4	98.0
Oshkosh	98.2	104.1	96.6
Kenosha	94.4	101.8	94.4
Moline-Rock Island	105.2	110.9	101.5
Springfield	103.6	108.7	98.9
Champaign-Urbana	103.5	111.1	101.4
Rockford	103.4	110.1	102.2
Decatur	101.2	108.8	99.1
Peoria	100.7	106.8	97.9
Bloomington	100.5	106.6	98.1

*Source of Data: Sales Management.

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